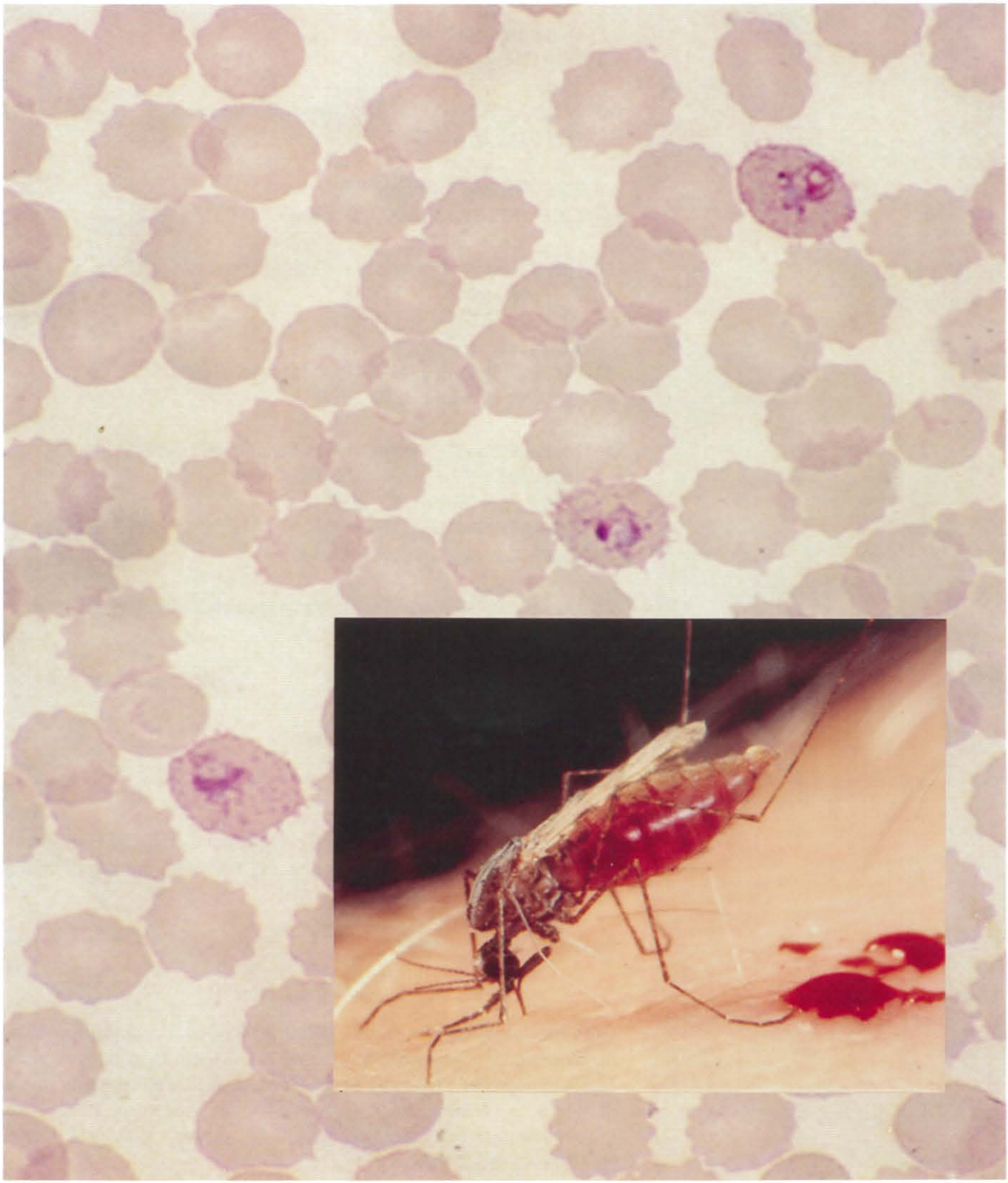
NAVY MEDICINE

March-April 1994



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COVER: *Anopheles* mosquito taking a blood meal, superimposed on a malaria blood stage infection. Three *P. ovale* trophozoites are visible. Story on page 16. Photos by Dr. E. Rowton, Walter Reed Army Institute of Research, Washington, DC, and LT Ellen Andersen, USN, Armed Forces Institute of Pathology. Digitized imagery by Moses Jackson, NSHS, Bethesda, MD.

Flag Officer Selectees

RADM-selectee **Joan M. Engel,** NC, deputy director of the Navy Nurse Corps, is a native of St. Marys, PA. She is a 1961 graduate of Mercy Hospital School of Nursing, Buffalo, NY, and received a Bachelor of Education in Public School Nursing from Clarion University, Clarion, PA, in 1969. CAPT Engel was Navy sponsored in 1981 to attend the University of Alabama, Birmingham, AL, earning a Master of Science in Nursing degree with a dual major in community health nursing and nursing administration. She has attended numerous Navy-sponsored leadership and management courses, and was the first Navy Nurse Corps officer to attend the Johnson & Johnson Wharton Fellows Program in Management for Nurses.

CAPT Engel has had a variety of duty stations and assignments since entering the Nurse Corps as a lieutenant in 1969. Clinical nursing assignments include Naval Hospital, Millington, TN; Branch Medical Clinic, Iwakuni, Japan; Naval Hospital, Charleston, SC; Branch Medical Clinic, LaMaddalena, Sardinia; and Naval Hospitals, Jacksonville, FL; Pensacola, FL; and Newport, RI. Administrative assignments include Bureau of Medicine and Surgery, Washington, DC, where she was the first junior Nurse Corps detailer; Naval Medical Command, Northeast Region, Great Lakes, IL, where she was the first assistant chief of staff, logistics; and both Naval Inspector General, Washington, DC, and Medical Inspector General, Bureau of Medicine and Surgery, Washington, DC.

CAPT Engel has had the opportunity to serve on a variety of Navy-

CAPT Joan M. Engel, NC

sponsored study groups. In 1990 she participated in the Navy Women's Study Group to assess the status and evaluate the implementation and efficacy of recommendations made in the 1987 Report on Progress of Women in the Navy. In 1990 she also served as chairperson of the Ethnic Minority Study Group, a recruitment and retention task force developed to examine ethnic and minority issues within the Nurse Corps. In 1993 she served as chairperson of the Medical Department Officers in Recruiting Process Action Team, a model team with representation from the Bureau of Naval Personnel, Navy Recruiting Command, and Bureau of Medicine and Surgery.

CAPT Engel is a Wharton fellow and a member of the American Nurses Association, Pennsylvania Nurses Association, Association of Military Surgeons of the United States, American Association of Nurse Executives, Navy Nurse Corps Association, Sigma Theta Tau, the Naval Institute, and American Association for Counseling and Development. Her decorations include the Meritorious Service Medal (4 awards), Navy Commendation Medal (two awards), and the National Defense Medal (two awards).

RADM-selectee **Jerry K. Johnson,** DC, dental officer of the Marine Corps, was born in Waukesha, WI, on 30 Jan 1945. After completing 2 years of predental study at Carroll College he went on to receive his D.D.S. degree in 1969 from Marquette University School of Dentistry. Additionally, he completed a rotating dental internship at Philadelphia Naval Hospital in 1970 and earned an M.S. in fixed prosthodontics from the University of Missouri at Kansas City School of Dentistry in 1975.

Dr. Johnson was commissioned in the Navy Reserve 1925 Program in 1965 and commenced active duty immediately upon graduation from

CAPT Jerry K. Johnson, DC

dental school. After completion of his dental internship and being augmented into the Regular Navy in 1970, he was assigned as assistant dental officer, Naval Station, Rota, Spain, from 1970 to 1973. Completing his fixed prosthetic residency program in 1975, he was assigned as the prosthodontist at Branch Dental Clinic, Quantico, VA, until 1977. He then reported aboard the USS *Yosemite* (AD-19), homeported in Mayport, FL, as assistant dental officer. He was then assigned to the Naval Dental Clinic, San Diego, CA, from 1979 to 1984. During his 5 years at Naval Dental Clinic, San Diego, he was a staff prosthodontist, developed and was the director for 2 years of the Navy's first Advanced Clinical Program in General Dentistry, and then was selected as branch director of the Fleet Anti-Submarine Warfare Branch Dental Clinic. Reassigned in 1984 to the 2nd Dental Battalion, 2nd Force Service Support Group, Fleet Marine Force, Atlantic, Camp Lejeune, NC, he was the Company Commander of the 22nd Dental Company from 1984 to 1985, and Company Commander of 2nd Dental Company and 2nd Marine Division staff dental officer from 1985 to 1987. From 1987 to 1990 he was the executive officer at Naval Dental Clinic, Norfolk, VA. From 28 June 1990 to 13 July 1993 he was commanding officer of Naval Dental Center, Orlando, FL. He assumed his present position 1 Aug 1993.

Dr. Johnson is a member of the American Dental Association, American College of Prosthodontists, Omicron Kappa Upsilon Honorary Dental Fraternity, and Association of Military Surgeons. His decorations include the Legion of Merit, Meritorious Service Medal with two gold stars, Navy Commendation Medal, Meritorious Unit Commendation, Navy "E" Ribbon, Navy Fleet Marine Force Ribbon, National Defense Service Medal, and Sea Service Deployment Ribbon.

RADM-selectee **William R. Rowley,** MC, deputy assistant chief for health care operations, Bureau of Medicine and Surgery, was born in Omaha, NB, but spent his childhood in Owatonna, MN, where he graduated from high school in 1961. Attending the University of Minnesota, he received a B.A. degree in psychology in 1966 and a M.D. degree in 1970. He served a surgical internship and first year of general surgery residency at the University of California, San Diego, from 1970 to 1972.

CAPT Rowley entered the Navy in 1972 as shipboard medical officer on USS *Tripoli* (LPH-10) which participated in minesweeping off the coast of Vietnam following the end of hostilities. In 1973 he was assigned to Naval Regional Medical Center, Philadelphia, PA, to complete general surgery residency training. He became a staff general surgeon there in January 1977. In July of that year he transferred to the Naval Regional Medical Center, San Diego, for a 1-year peripheral vascular surgery fellowship. He stayed on in San Diego as a staff vascular surgeon, and in 1980 became head of the peripheral vascular surgery division and fellowship program director.

CAPT William R. Rowley, MC

From 1985 to 1988 Dr. Rowley was chairman of the department of general surgery and residency program director. He also became director of surgical services from 1987 to 1988. In October 1988 he transferred to Naval Medical Command, Southwest Region as assistant chief of staff for plans and operations. In the spring of 1989 he was assigned to 4 months additional duty on a management assistance team chartered by the Blue Ribbon Panel on Navy medicine where he made assist visits to many Navy hospitals. In September 1989 he was transferred to the National Naval Medical Center in Bethesda, MD, as deputy commander. He became the commanding officer of Naval Hospital, Camp Pendleton, CA, in August 1991. In July 1993 he transferred to the Bureau of Medicine and Surgery, Washington, DC.

Dr. Rowley is an associate clinical professor of surgery at the Uniformed Services University of the Health Sciences, Bethesda, MD. He is a member of the International Society of Cardiovascular Surgery, Peripheral Vascular Surgery Society, Southern California Society of Vascular Surgery, American College of Surgeons, Association of Military Surgeons of the United States, American College of Physician Executives, American College of Healthcare Executives, and American Medical Association.

Dr. Rowley's awards include the National Defense Medal with gold star, Philippine Presidential Unit Citation, Navy Meritorious Unit Citation, Navy Commendation Medal, Meritorious Service Medal, and Legion of Merit. ❑

A Naval Academy midshipman checks his shoulder straps before a "punch-out" in a mechanical ejection seat trainer as HM2 Jeff Carter keeps a close watch.

Learning Survival at Naval Hospital Cherry Point

Whether it's in a helicopter, or a high-speed jet aircraft, a matter of milliseconds can determine life and death for aircrews in the event of an airborne mishap that requires an ejection or ditching. Each year, the 22 sailors who man Naval Hospital Cherry Point's Aviation Physiology and Water Survival Training Department train thousands of first-time, or "indoc," and refresher aircrew members from all branches of the military to react to those crucial seconds not with panic, but with confidence.

That confidence is instilled in aircrews through an intensive series of lectures, demonstrations, and hands-on applications of the aspects of human physiology and water survival procedures. Navy instructors teach students about how their bodies physically react to flight conditions, and how adverse physiological effects can weaken the link between man and machine.

The CNO-directed program was generated in response to problems encountered by Navy and Marine Corps flight personnel confronted with survival in a water environment after an emergency, and represents the best "lessons learned," said LT D.A. Ratcliff, NAWSTP department head.

The two-part program is taught on varying levels, or profiles, tailored to the individual needs of the student. All profiles begin with physiology lessons concerning aviation stress factors, sensory physiology, night vision reaction, aeromedical aspects of seat ejection, the effects of high-gravity body stress and high-altitude oxygen deprivation, or hypoxia, all of which affect the brain's ability to react quickly.

Hands-on applications during the physiology portion include a static and dynamic seat ejection on a mechanical trainer for jet community students, and a high-altitude ride in a hypobaric chamber, which all students are required to experience.

The chamber simulates ascent to various altitude levels, allowing students the opportunity to feel the effects of altitude compression on their bodies, such as inner-ear and gastrointestinal pressure. Once at the maximum designated height (25,000 feet for fleet jet, prop, and helo aircrew students), the oxygen masks worn on the trip up are unattached for a maximum of 4 minutes, so that each student can experience the effects of high-altitude hypoxia.

Students not yet on flight status, or in a lower profile training level, such as Naval Academy midshipmen, "fly" at lower altitudes with full oxygen at all times.

On the water-training side of the house, students receive comprehensive survival training both in a classroom setting and in the air station's combat swimming pool during the summer months. During the winter, the water training department "deploys" its pool classes each week to MCAS New River and Camp Lejeune, NC.

Coast Guard search and rescue helicopter crewmembers from Alexandria, VA, prepare for a "crash" in the helo dunker.

During water classes, trainees are first taught to identify survival gear they will wear or have access to in flight, such as gravity suits, survival vests, flotation and signaling devices, and life rafts.

Students also learn how each survival aid functions and how they will employ it under a stressful survival situation. Again, water survival confidence is accomplished through rigorous hands-on training.

Water survival training begins with students treading water and drown-proofing, or "dead-man" floating, in a combat pool, under the strict supervision of Navy corpsmen. Each individual is tested on 2 minutes of each survival float, and on each survival swimming stroke in the pool, while clad in full combat flight equipment to include flight suit, survival vest, gloves, boots, and helmet. In addition, the students are tested on their ability to deploy and inflate the survival vest's flotation unit bladders both manually and automatically while treading water.

Extended sea survival techniques are also discussed and practiced to prepare for the event of a downed aircrew member who cannot be rescued for an extended period. Priorities—flotation, first aid, shelter, communication and food—are consistently brought to the students' attention by instructors as they attack each training task.

Devices like the helicopter rescue lift, parachute drag, and parachute drop aid in teaching the students how to perform proper parachute water entries, drag and disentanglement egress procedures, and airborne helo rescues from the water. Students also undergo multiplace aircraft underwater egress procedures in 9D5 device, often known as the "dunk tank," "helo dunker," and "beer can." The device is designed to simulate escaping a multiseat helicopter fuselage after splashing into the water and rolling upside down, while sinking to a depth of 15 feet.

The NAWSTP team trains nearly a thousand students each year in the physiology department, and nearly 3,000 students each year in water survival and in the helicopter egress device. Students are individually graded on each of the training events and must pass a final written examination at the end of the program to qualify for flight status.

If a student cannot pass a requirement, a conditionally qualified grade is given and the student has 90 days to

A Marine water survival student, wearing 40 pounds of flight gear, struggles to stay afloat during a swimming test as a Navy corpsman keeps close watch.

complete the requirement for qualification. In the event the student is completely unqualified, he is grounded until a qualification can be obtained.

"Our goal is to have anyone who sets foot in a military aircraft qualify under our program," said LT Jim Giordano, aviation physiologist and division officer for training and hypobarics. "The human factor is the most important link in the chain between man and machine, no matter if that person is in a helicopter, prop, or multimillion-dollar jet aircraft."

Giordano added that there has been a 60- to 80-percent increase in ejection and ditching survivability in the military aviation communities due to physiology and water survival training, and that his team is confident of the students' knowledge of survival techniques when they complete the program.

"They come here as aviators and we turn them into fish. They just aren't prepared for things like the chamber and the helo dunker when they arrive. We put them into those situations and they learn to handle themselves," Giordano said. "After our training, there won't be any surprises for them in the real situation if it happens. The knowledge will take over and it will come back without them even thinking twice about it. I've seen it happen more than once."

1st LT Bradley Close, USMC, an electronics countermeasures officer with Marine Tactical Electronic Warfare Squadron-2, recently learned the truth of those statements, when his four-seat EA-6B Prowler aircraft splashed into the Neuse River.

"An actual 'punch-out' from an aircraft is much more violent than can be simulated during training," he said. "When I ejected, the force of the wind knocked my helmet off and blew all the survival gear out of my vest pockets. At the time, it was hard to think about survival procedures—they just came to me without thinking. The most important thing running through my mind was if I was okay, and if my crew had made it out okay, too."

Close added that it had been 2 years since he had attended a flight physiology and water survival training class. "Training that will keep you alive in a situation like that is definitely worth remembering," he said. ❑

—Story and photos by CPL Daniel C. Hottle, USMC, Joint Public Affairs Office, 2nd Marine Aircraft Wing, MCAS Cherry Point, NC.

Naval Academy midshipmen tighten their oxygen masks before ascending to 10,000 feet in the hypobaric chamber.

Photos courtesy of CDR Michael T. Curran, DC, USNR

Co-pilot Captain Thomas Curran and sons the morning of ill-fated Flight 808

The "Miracle" of Flight 808

On 18 Aug 1993, a four-engine stretch DC-8 cargo jet from American International Airways, Flight 808, was on its final approach to runway 10 at Guantanamo Naval Base, Cuba. The plane was inbound from Norfolk, VA, with a cargo of mail and supplies. On board the aircraft were three crewmembers, Pilot-in-Command, CAPT James Chappo; Co-pilot, CAPT Thomas R. Curran; and Flight Engineer, Second Officer David Richmond. Instead of coming in for a landing on a straight-in approach for runway 28, the plane was coming in for landing on the much more difficult runway 10. Unfortunately, at 1654 hours, with the plane in a steep right hand bank and within the final seconds of its flight prior to landing, something went wrong and the plane crashed, cartwheeled, broke apart, and burned.

As part of their normal, ongoing program of training, the base crash and fire crews were on the scene for what was to be just another normal landing. Instead, it was time to put all their training into immediate practice. Within 12 minutes from the moment of the accident, crash and fire truck crews were pulling the critically injured crewmembers from the cockpit of the plane. Fortunately, due to the severity of the crash im-

pact, the cockpit broke away from the main body of the airplane and rolled clear of the fire engulfing the wings and fuselage. Luckily also, when the cockpit stopped rolling it cleared a minefield, by a mere 50 yards.

The crewmembers of the plane were all still alive, but all were critically injured. With the severity of their injuries, the time necessary to get them to the primary treatment facility became absolutely critical. If the crash occurred at any other airfield, the severity of the crash would probably have been fatal for the three men. Fortunately, one of the Navy helicopters was fired-up and available to fly the injured to the base hospital immediately after their removal from the cockpit.

With word of the emergency, the entire base was mobilized for mass casualty care. The hospital medical staff, the dental clinic staff, chaplains, all participated in the rapidly developing emergency. The Marine Corps Barracks was called upon for voluntary blood donations.

The co-pilot, Thomas Curran, was brought conscious into the emergency treatment area. Large facial skull lacerations and a depressed skull fracture were immediately apparent. Most immediately threatening, however, were the multiple severe compound fractures of his left femur, left and right tibia and fibula, shattered right knee, and his shattered left and right ankles. Less immediately pressing were the fractures in both left and right wrists, lumbar vertebrae, and floor of the right orbit.

By 1930 hours, all his fractures had been stabilized, dressings had been placed over the lacerations and he was the first of the injured crewmen outbound from Guantanamo Bay for the flight to Ryder Trauma Center at Jackson Memorial Hospital in Miami, FL. A Coast Guard medevac jet was fortunately at the Guantanamo airfield and received emergency Cuba overflight permission. This enabled a 45-minute saving on the flight to Miami, a flight which took them directly over Havana.

The wreckage of Flight 808

The pilot, James Chappo, had severe chest compression injuries, along with fractures to his lumbar vertebrae and right wrist. Medication was able to stabilize his heart function and he was the second member of the crew to be medevaced to Miami.

Second Officer David Richmond was in extremely critical condition when he was brought into the emergency treatment area. It had taken the longest time to remove him from the

Right and below: **Captain Curran recovers at Atlanta's Meadowbrook Hospital.**

wreckage of the cockpit since he had been pinned beneath heavy equipment. He had received such severe compression injury to his heart that it was not functioning properly. Trauma to his face was so severe that virtually every facial bone had been fractured. In addition, he had a severe compound fracture to his left leg and a fractured shoulder. Basic stabilization and transport would not suffice for Richmond. In order to have any chance for survival, he required immediate emergency surgery at Guantanamo Hospital. Medical and Dental Corps personnel composed the operating room staff. Even though Richmond "coded" during the 11 hours of thoracic and abdominal surgery, he was able to be revived and the surgery was successfully completed. Finally, at 0430 the next morning, he was determined to be stable enough to attempt the medevac flight to Miami. The estimate was that he had only a 5 or 10 percent chance of surviving the flight.

Once the three injured crewmen arrived at Ryder Trauma Center in Miami, the scene was just as active as it had been at Guantanamo. All three crewmen survived their 2-hour medevac flights and were again undergoing emergency surgery. Fortunately for Richmond, the thoracic and abdominal surgery had been performed so well at the Navy Hospital in Guantanamo that no further surgery to those areas was required. The first 96 hours were the most critical and all the men remained stable to that point, even though they remained unconscious.

Unfortunately for Curran, the injuries sustained to his right knee, leg, and ankle were so severe that amputation was recommended at the mid-knee level before gangrene set in. His brother discussed this recommendation with the attending physicians and stressed to them that as a Navy trained pilot, flying is Tom's career and that if amputation had to be done, a below the knee amputation would most likely allow him to fly again. The physicians agreed to this, even though the reconstruction to the right knee was an extremely difficult technical procedure. Aggressive orthopedic surgical procedures were also used to set and stabilize the multitude of fractures to his left femur, tibia, and ankle.

Richmond required extensive surgical and plastic reconstruction for his facial fractures. Also, aggressive vascular surgery procedures were required to establish blood flow to the skin-graft sites where his compound left leg fractures had been reduced.

Chappo required setting of his fractured right wrist. He was the first crewman to regain consciousness after 5 days in the hospital. After 10 days, he was the first to be released and was able to go home.

For the other two crewmembers, their stay at Ryder would be much longer. After 10 days Curran and Richmond had regained consciousness, but it would be 2 months until they would be finished with their reconstructive orthopedic and skin grafting surgeries and ready for their release to intermediate, subacute care facilities. Curran was released to Meadowbrook Hospital in Atlanta, GA. Richmond was transferred to St. Joseph Hospital in Ypsilanti, MI. After two additional months, both were healthy enough to continue their recuperation at home.

Second Officer David Richmond with wife Cheryl at the Ryder Trauma Center, Miami

The pilot of Flight 808, Captain James Chappo, has fully recovered and is awaiting the results of the National Transportation and Safety Board investigation into the cause of the accident prior to his resumption of his flight status. The Second Officer David Richmond probably will resume his flight status after an extended period of convalescence.

The road to recovery for the Co-pilot Captain Thomas Curran is going to be the longest of all. In December, I thanked God for the privilege of being able to share with Tom his 50th birthday. Five months after the accident, he has taken his first steps on his left leg with the aid of a walker. For a man who had been used to running 5 miles a day and who has been unable to be mobile since the accident, he knows now that the road to recovery has begun. His goal to which he is totally focused is to climb back into the cockpit again and resume his career in aviation. His role model is MAJ Douglas Bader of The Royal Air Force who, even though he had a below the knee amputation to his left leg and an above the knee amputation to his right leg, was able to fly and fight against the Luftwaffe throughout World War II. Having had Tom as my role model all of my life, and knowing what his inner drive, effort, and motivation has been for flying since he was a child, I am fully confident he will achieve his goal in record time. For my brother, his family, the other crewmembers of Flight 808 and myself, I wish to express my deepest gratitude to all the members of the U.S. Navy team in Guantanamo Bay. Navy pride, professionalism, and training were shining on 18 Aug 1993. ❑

—Story by CDR Michael T. Curran, DC, USNR, Bureau of Medicine and Surgery (Code 106), Washington, DC.

Naval Reserve Bolsters Navy Pilot Program

Boot camp recruits received a high level of attention last summer from the Navy and Naval Reserve at Naval Training Center Orlando, FL. Approximately 11,000 recruits are the first to benefit from the new Phased Dentistry program designed to improve fleet readiness. The Phased Dentistry concept includes examining and treating early—during boot camp, if possible—all dental conditions that could become emergencies during the following years. Thus when sailors complete training and arrive at their first duty stations, they will go to work with higher dental readiness. Fleet commands will have fewer medical evacuation requirements and fewer lost man-hours.

Initial reports are impressive. Though final statistics and analysis will not be done until the pilot program is completed after September 1994, recruit dental readiness went from approximately 15 percent to almost 90 percent during the first 3 months of the Phased Dentistry program—more than double the usual gain in dental readiness during boot camp.

"This program has been a huge success and will pay dividends in increased readiness and funds saved," says RADM Thomas F. Hall, Commander, Naval Reserve Force. Early last spring, when the Navy asked for help in launching the pilot program, RADM Hall enthusiastically responded. More than 260 Selected Reserve dentists and dental technicians will have spent their annual training and other Reserve duty time to help their active Navy counterparts at Naval Dental Center (NDC) Orlando to process the recruits. Together, the "One Navy" team executes a flawless evolution of professional dental care for the new sailors.

NDC Orlando leaders looked ahead and made smart use of Naval Reserve talent to make the project succeed. "Where," they asked, "are the best places in the clinic to use reservists, and where to use active duty?" Ultimately, they decided to train full-time active duty staff to perform the recruit dental examinations and diagnoses in a standardized manner, and to use Reserve dentists and dental technicians to bolster the active duty staff in Phase III patient treatment. The NDC staff provided support so that reservists could check in, get a briefing and start working chairside by 1030 the first day.

Active duty Navy dental personnel also were winners, providing a high quality of care both in treatment and in preventive services to more recruits than ever before. NDC Orlando reallocated staff duties to respond to varying needs of each recruit company; they reconfigured clinic facilities and brought in extra equipment to serve the summer surge of recruits. Working closely with Naval

Training Center Orlando, NDC expanded its hours to accommodate more recruits each day. When each boot camp company reported for initial dental examinations, NDC staff gave the recruits demonstrations and talks on dental hygiene.

The preventive hygiene education is a quality leap from recruit awareness exhibited several years ago, when a Reserve dentist, while examining a recruit from another service branch, exclaimed, "You haven't brushed your teeth in 4 weeks!" "Five weeks, sir," the recruit replied. "They issued me only one brush . . . so I use it on my boots."

Readiness

Perhaps the greatest winners of all are the sailor recruits, some of whom had received little or no dental attention in their young lifetimes. With health and well-being improved through the immediate treatment of conditions that cause suffering and pain, each recruit is better able to learn, train, and serve the Navy.

Phased Dentistry is a two-step approach to dental readiness. In the initial stage, which is titled Phase III, sailors with Dental Class 3 (high-risk category) needs are processed and treated prior to their first permanent duty station. The Navy's goal is that all Phase III care be completed during recruit training, apprentice training, and/or "A" school training. Afterwards, during Phase II, the sailors receive dental treatment for preventive and special care conditions needed to maintain dental readiness. Phase II treatment is provided at NDCs and operational support clinics worldwide.

Excellent planning kicked off the project. The Phased Dentistry concept of care, designed as a total quality leadership (TQL) initiative, was based on a 1991 needs survey conducted at the Recruit Dental Inprocessing Facility, Orlando. The Phased Dentistry pilot program, spearheaded by NDC Commanding Officer CAPT J.K. Johnson and Executive Officer CAPT Joe Draude, was endorsed by Chief of Naval Education and Training (CNET) in August 1992, and approved for 1993 implementation by the Surgeon General. Coordination among leaders at the Bureau of Medicine and Surgery (BUMED), Commander Naval Reserve Force, CNET, and other major commands has been a success story for Navy professionals.

Last year, dental leaders decided to advance the pilot program to begin in June instead of October. However, the summer surge of an extra 850 recruits each month would require more manpower than the Dental Center could provide, with its already projected monthly volume of 1,650 recruits during the year.

Where to turn for help? The Reserve Force's trained corps of dental professionals was a perfect source. Key players include RADM Ronald Morse, DC, chief of the Navy Dental Corps, who selected RADM James Yeargin, DC, USNR, to be coordinator for Reserves during the Phased Dentistry project. Under the direction of RADM Thomas F. Hall, COMNAVRESFOR, and others including RADM Roger W. Triftshauser, DC, USNR, deputy assistant chief for dentistry, BUMED, the massive Reserve support operation was achieved.

At COMNAVRESFOR headquarters in New Orleans, LA, CAPT Craig Marcello, DC, USNR, force dental officer, expedited the rapid response of the Reserves in obtaining orders and filling billets needed with Reserve dentists and dental technicians. Help also came from Reserve Air and Surface headquarters staff members such as HMCM Ronald Toland and HM1 Robert Lewis, who coordinated numerous details.

In Orlando, NDC Reserve liaison officer LCDR Rick Young, USNR, and other staff members interfaced with active Navy and Reserve commands to bring Selected Reserve dental personnel on line. When reservists arrived at NDC, they were greeted by Selected Reservist DTCS Hal Morrison, on full-time duty for 4 months. He and a few full-time NDC staff did the "legwork" and paperwork for reservists, freeing the Reserve Dental Corps to treat a maximum number of patients. "Gearing up for Phased Dentistry has been especially challenging for our staff," said CAPT Lawrence McKinley, NDC commanding officer. "Our active duty and reservists, working hand in hand, have made this project a success."

The Navy had a good idea, and reservists helped make it happen, faster and even more successfully than originally planned. With force multipliers like this, the Navy and Naval Reserve are an unbeatable team—during world conflicts as well as in peacetime. ❑

—Story by Pat Antenucci, COMNAVRESFOR Public Affairs, New Orleans, LA.

Strategic Planning and TQL at Doctrine Center

LCDR Bill Johnson, MSC, USN

Imagine the following scenario. You just checked into a new command as the person in charge of an office undergoing major reorganization. Your bosses want a lot of changes but are not too specific about those changes; you face an almost 100 percent turnover in staff. Most of the current staff have little or no experience in the line of work done by the office. The activity recently relocated geographically from one state to another. Most exciting of all, you organizationally report to one command for administrative control (ADCON) and another command for operational control (OPCON). Nothing exists in writing delineating details of this ADCON/OPCON situation. What do you do?

You can: (1) make sure your life insurance is paid, (2) update your resume, (3) adopt the natural tendency to fight fires, or (4) attempt to do one or more of the first three. In the Navy, fire-fighting is very popular, but if you can resist this natural tendency, one more alternative exists which makes the above actions unnecessary. This alternative involves using *strategic planning.* Navy medicine, in its publication, *Journey to Excellence* (page 12), defines strategic planning as "the process by which the guiding members of an organization envision its future and develop the necessary procedures and operations to achieve that future." This definition summarizes the process, as described in the remainder of this article, which was used by the Naval Medical Doctrine Center in a real-world scenario.

Decision to Engage in Strategic Planning

Just such a situation faced CAPT Elias Rosenblatt when he checked aboard as the Director of the Naval Medical Doctrine Center. Organizationally, the Doctrine Center reported to the Commander, National Naval Medical Center in Bethesda, MD; physically, it operated out of the Naval Medical Clinic in Quantico, VA, having only recently relocated there. During a briefing the previous spring, the Surgeon General directed that the Doctrine Center seek a new organizational form, separate from that of the National Naval Medical Center.

Upon CAPT Rosenblatt's arrival, he resisted the natural fire-fighting tendency and called a staff meeting to propose that the Doctrine Center engage in strategic planning with a total quality leadership (TQL) exercise he called "Future Direction for Our Company."

An imaginary scenario—named "New Directions" by CAPT Rosenblatt—formed the basis of this exercise. New Directions required Doctrine Center staff to imagine (a key mental stimulus in strategic planning) its present situation to be similar to a new business venture. New Directions postulated that a "company's" board of directors had directed it to relocate geographically, to adopt a new organizational form, and to change its product line. He suggested using TQL methodology and techniques to accomplish the board's desires: staff participation, group decision making, and a focus on defining the customers, products, and resources. The staff readily accepted his desire to "market" Doctrine Center products and services and his belief that a *vision* of the future was needed.

Why TQL?

Two staff members, the director, and the recently arrived deputy, had been involved in TQL at their previous commands.

Both considered strategic planning essential to surviving in a *resources-constrained* environment. They felt that time spent in planning would reduce time spent "fighting fires" later.

During its first meeting, the Doctrine Center staff enthusiastically endorsed the need to engage in strategic planning and readily accepted TQL as the preferred methodology to use. Staff experience with TQL, other than that cited above, was virtually nonexistent.

Meeting Mechanics

Overall, the meetings followed a TQL format and used meeting techniques learned by the facilitator (deputy director) in TQL training. The director assumed the role of team leader. The recorder distributed an agenda to all team members before the meeting; this allowed all members to attend prepared for discussion on the topics at hand.

Each meeting opened with the recorder's reading of minutes of the last meeting. This action focused members' attentions on the current topics. Part of the agenda included an objective or purpose for the meeting, which was restated in the reading of the minutes. The leader also summarized key roles on the team and which members were assuming these roles; this included facilitator, recorder, and timekeeper.

The recorder kept fairly detailed minutes of every meeting and summarized his notes at the end of the meeting. This ensured good communications among team members; several times this summarization revealed differences in members' understandings of a particular point.

Finally, success of the Doctrine Center's strategic planning efforts depends in no small part to one particular TQL meeting tool: fairly strict adherence to the time allotted in the agenda to each topic.

The facilitator conducted TQL training at 10 of the 23 meetings. This usually comprised a 20-minute review of some TQL topic or technique. For example, at one meeting he presented information on "brainstorming," a technique whereby many ideas on a given topic are generated by the group. On other occasions, he reviewed TQL concepts and philosophy, such as Deming's Fourteen Points.

What Next?

Now that you have a feel for the mechanics of the Doctrine Center's strategic planning meetings, again put yourself in the Doctrine Center staff's shoes. You just started to work in an organization undergoing a major change in the way it does business; your boss wants a change in your company's directions. Your team agreed to engage in strategic planning using a TQL process. What now?

Strategic planning generally results in establishment of company goals and objectives. Goal formation requires a clear, widely held understanding of company *mission and functions*. The team decided that its first priority was to develop a "company" mission statement. Problems arose immediately. A lack of knowledge emerged regarding what should be the content and purpose of a mission statement. To whom is the mission statement addressed? The first three meetings addressed these and other mission statement issues without much apparent success.

A major breakthrough occurred when the team next decided that it must first understand what its products were before it could develop a mission statement. It took several meetings to achieve progress. During one of them, a "water-shed" occurred in the Doctrine Center team's strategic planning process. This was the only meeting that broke the cardinal rule of strict adherence to agenda time limits to any great extent. In retrospect, it symbolized the storm before the rainbow; in TQL terms, it was the team's "storming" before its "performing." After this meeting, the team knew where it wanted to go and how to get there.

The "Factory" Emerges

During this period, the concept of the "factory" emerged. The director's initial tasking of his staff directed them to imagine a scenario wherein they were managers of a fictitious company with products and customers. As the staff became more comfortable with role playing, they realized that what they had to develop was a "factory" for producing doctrine, as well as other doctrinally related products and services. The "factory" concept represents perhaps the most important result of the Doctrine Center's strategic planning process.

The "factory" concept embodies some of TQL's most important aspects. Reduction of variation and improvement in quality of output exist as prime goals of the TQL process. To attain these goals consistently over time, an organization must institute standardized procedures. If procedures are improved, output quality should improve.

The team began to realize that its next strategic planning task would be to design a "factory" for producing its goods and services. The theory behind the "factory" is insightful. Adopt a standard, well-designed method for developing doctrinal publications. If two people are tasked to develop doctrine on the same subject, using this method will result in their producing publications of similar formats and similar quality, and containing similar sets of information. The "factory" embodies both people and systems. The team now turned to the task of designing the "factory."

Action Diagrams

At a late summer meeting, the team adopted a tool for designing the "factory." Prior to this, the facilitator reviewed systems design methodologies and recommended adoption of action diagrams as the preferred methodology. The team intended to design a complex "factory" and needed an easy to understand tool which could handle minute details, high-level processes, and database design.

Team efforts during this period comprised primarily what they called "building the factory." The goal of these efforts became one of using the action diagram tool to describe what was perceived to be the most important component or process within this "factory"—developing a doctrinal publication.

The staff, most of whom were new, needed a guide to show them how to produce a doctrinal publication. This guide would also serve to standardize output and reduce variation in the quality of doctrinal publications. The team anticipated that, over time, the action diagram for writing a doctrinal publication would be revised to incorporate improvements to the process and, thereby, result in improvements in the quality of doctrinal publications.

The team met its goal; it completed action diagrams for writing a doctrinal publication and writing an article for publication. The action diagram for writing a doctrinal publication occupies eight pages and is not included in this article for that reason. Staff members currently use this action diagram in developing doctrine on several subjects, including fleet hospitals, hospital ships, and doctrine for civilian humanitarian support.

Strategic Planning/TQL Critique

Tedious, time-consuming, tiring. All describe strategic planning. Was it worthwhile? Should you engage in strategic planning? If so, should you use the TQL methodology? You bet! Even if only done by an individual for his or her own purposes, effective strategic planning benefits those who engage in it.

Doctrine Center planning efforts over a 3 1/2-month period yielded a mission and function statement, methodologies for developing doctrine and writing articles for publication, and an experienced team ready to tackle future tasks and problems. This latter result probably represents the most important product of the TQL process. The team's experience with broad strategic planning concepts enhances its ability to improve on the tactical issues of process improvement. No one on the team considers the products developed to date "cast in stone." All realize that improvement will occur over time.

Innovative Concepts

Three innovative concepts resulted from Doctrine Center's strategic planning efforts: the "factory," and the use of action diagrams and the encyclopedia in the TQL process.

The team developed the encyclopedia as a technique of recording everything surrounding development of medical doctrine. This includes notes on the results of meetings, topic outlines, points for discussion, and any other written or recorded item associated with that particular doctrinal effort. The encyclopedia thus becomes a very useful tool in the future when it becomes necessary to revise that doctrinal publication. It also facilitates training of new staff. The beauty of the encyclopedia concept lies in its extendibility to other areas. All processes, major or minor, within a "factory" can be described in an encyclopedia; at its very basic level, standard operating procedures are an encyclopedia.

Finally, action diagrams, especially when used in conjunction with an encyclopedia, represent an outstanding tool for describing and documenting processes within organizations. Action diagrams improve on flowcharting and offer better understandability for teams engaged in planning efforts or process improvement. They facilitate team communication—the most basic goal of any team engaged in strategic planning and TQL.

Which TQL Tools Worked

TQL works extremely well in the strategic planning process. Staff turnover and the resultant loss of corporate knowledge of doctrine development created a need at the Doctrine Center for a participative planning process. No one possessed enough knowledge to "do it by himself." TQL, through its emphasis on the team and employee empowerment, provided the right planning methodology. The meeting tools learned at TQL facilitator training assisted the planning effort by increasing meeting productivity. Developing and adhering to agendas, brainstorming, using affinity diagrams, and the other TQL meeting techniques proved to be "force multipliers" in conducting the meetings. ❑

LCDR Johnson is Deputy Director of the Naval Medical Doctrine Center, Quantico, VA.

Naval Medical Research and Development Command Highlights

- **Universal Donor Blood for Military Emergencies**

The Navy Medical Research and Development Command is currently supporting clinical trials of transfusion therapy using type B red blood cells enzymatically-converted to type O (universal donor) red blood cells. Converted red cells are used in the same way as negative type O cells are used. The FDA-approved Phase I clinical trials at the New York Blood Center and the General Clinical Research Center of the Rockefeller University Hospital are to assess immune response in volunteers and establish optimal treatment conditions for producing enzymatically-converted red blood cells. Those trials are almost complete. Phase II testing has been approved by the FDA and is pending. Positive results from the research and clinical trial will not only provide a method to develop a continuous supply of type O red blood cells—cells that may be transfused to recipients of any blood type—but also will make greater use of existing supplies of blood types A and B, which are sometimes unused and discarded. Through the use of enzymatically-converted type O red blood cells, it will be possible to stockpile by freeze preservation a single universal donor blood group for military emergencies. This would eliminate shortages of blood due to blood group incompatibility, eliminate the necessity for separate storage facilities for supplies of four different blood groups, and reduce the requirements for blood typing under operational conditions. For more information contact CDR P.D. Kent, MC, NMRDC Research Area Manager for Combat Casualty Care, DSN 295-0880 or Commercial 301-295-0880.

- **R-134a Is Being Evaluated for Ship and Submarine Use**

In certain operational environments sailors and marines are at risk of exposure to environmental contaminants that may threaten their health and degrade operational performance. Currently, ozone depleting substances used as coolants and refrigerants are being replaced with R-134a (1,1,1,2-tetrafluoroethane) and other non-ozone depleting substances. Due to the unique environments aboard ships and submarines use of R-134a could create scenarios where personnel are exposed to undetectable, low concentrations for extended periods of time or to rapidly increasing concentrations in enclosed areas (R-134a is a clear and colorless gas with little odor or taste). Safety data provided by manufacturers does not provide nonlethal, acute toxicity information. Researchers at the Naval Medical Research Institute Toxicology Detachment at Wright-Patterson AFB, Ohio, are developing tests to determine whether performance deficits, behavioral dysfunction, and incapacitation without lethality can occur at low levels of concentration or after brief exposures. Additionally, using the tests, researchers will be able to evaluate the toxicity of not only R-134a but also any oxidative or pyrolysis product from combustion of the substance, another set of data generally not available from the manufacturer. The resulting data will be used to develop models predicting human exposure consequences in actual use situations, to tailor exposure limits during exposure conditions and to recommend medical surveillance and treatment guidelines. For more information contact LCDR P. Knechtges, MSC, NMRDC Research Area Manager for Fleet Occupational Health, DSN 295-0885 or Commercial 301-295-0885.

- **Search for New Director of R&D**

The Naval Medical Research and Development Command (NMRDC), Bethesda, MD, is seeking candidates for the position of Director of Research and Development. This position will be available in May 1995. The NMRDC Director of Research and Development reports to the commanding officer, and is responsible for planning, integrating, and being spokesperson for Navy medical program costing about $100 million annually. About 50 percent of program funds are spent in laboratories subordinate to NMRDC, and the other half are invested in federal institutions, contracts, and grants. The immediate staff of the director is 17 people, and collaboration extends to laboratory commanding officers, officers in charge, and chief scientists. The technical areas presently included in the Navy medical R&D program include combat casualty care, infectious diseases and biological defense, human performance and environmental physiology, aviation medicine, undersea medicine, deep-sea diving, occupational health, epidemiology, environmental health, preventive medicine, oral health, immunology, and transplantation. The program emphasizes readiness and fleet support and responds to requirements which the Navy Department cannot meet by adopting biotechnology developed elsewhere. In the past, the Director of Research and Development has been a Captain of the Medical Corps, Dental Corps, or Medical Service Corps, or a member of the Senior Executive Service. The ideal candidate would be a gifted briefer having broad knowledge of the technical areas in the program, familiarity with Navy and other service biomedical research, ability to work in the Washington environment including BUMED, the Pentagon, Capitol Hill, and the Office of Naval Research, and capability to use financial management principles (e.g., balance of marginal cost and benefit, net present value) to guide program decisions. For more information contact the Commanding Officer, NMRDC, Commercial 301-295-0287 or the incumbent, Commercial 301-295-0883.

Malaria (Part 1)

Lessons From Somalia and General Slim

CDR James M. Crutcher, MC, USNR
LCDR Trueman W. Sharp, MC, USN
CDR Mark R. Wallace, MC, USN
CAPT Stephen L. Hoffman, MC, USNR

British forces were being routed; a new strategy was necessary to avert a military catastrophe. Addressing his plight, Sir William Slim, British Field Marshall in Southeast Asia in World War II, stated, "In 1943, for every man evacuated with wounds, we had one hundred and twenty evacuated sick. The annual malaria rate alone was 84 percent per year of the total strength of the army and even higher among forward troops. A simple calculation showed me that in a matter of months at this rate my army would have melted away."(1) Slim realized that the main source of the problem was failure to comply with malaria discipline and that he had the power to change that. Slim's solution was to perform surprise checks on whole units to determine whether quinacrine hydrochloride (the chemoprophylactic agent at the time) was being taken. "If the overall result was less than 95 percent positive, I sacked the commanding officer. I only had to sack three; by then the rest had got my meaning." As a result of such actions by General Slim and other commanding officers, attack rates of malaria decreased dramatically during the last half of World War II, even though combat was still occurring in malarious areas.(2)

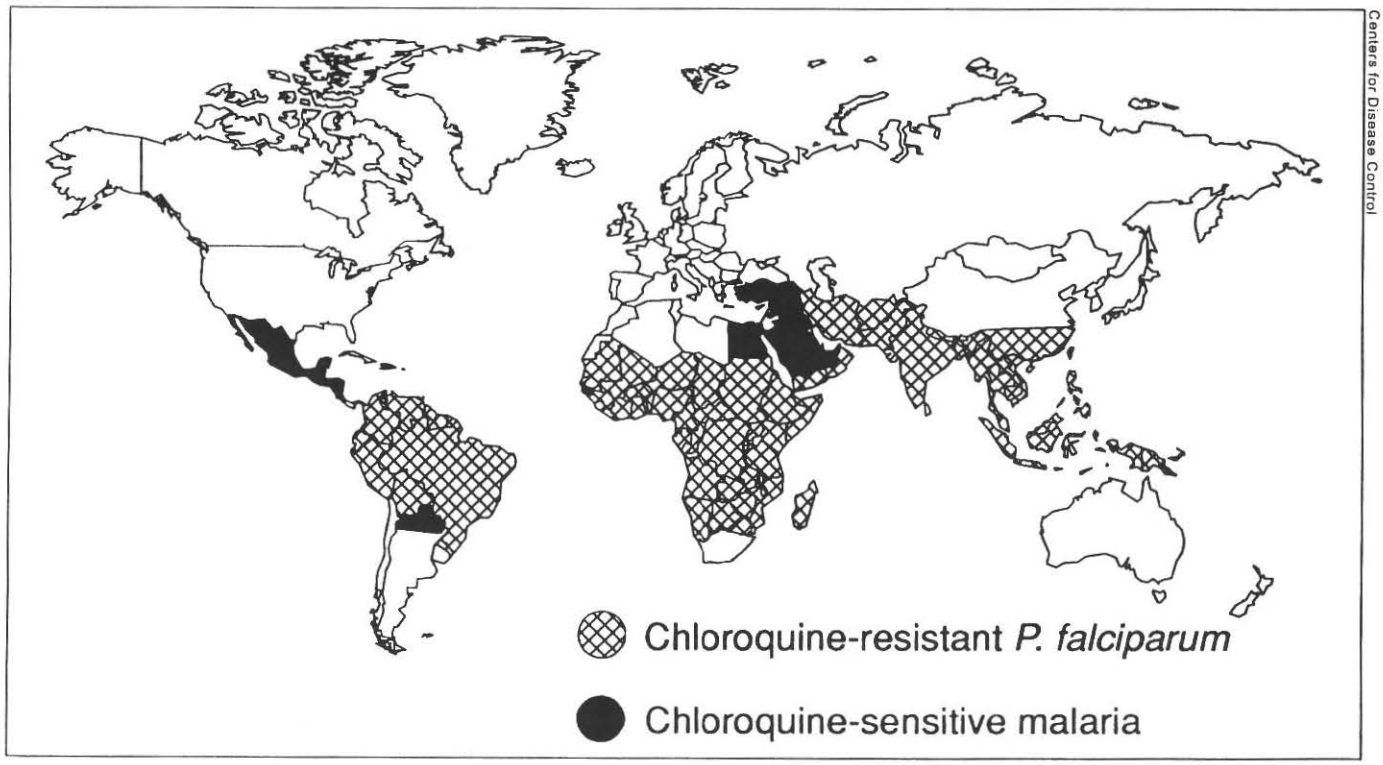
Malaria Prevention: A Dual Responsibility

This account illustrates malaria's well earned reputation as a potential "war stopper." During World War II it accounted for 113,256 cases, 90 deaths and 3,310,800 lost man-days in naval forces,*(2) and disrupted U.S. Army operations in Southeast Asia and North Africa. In Vietnam, entire combat battalions were at times rendered ineffective by the disease.

It also illustrates the effort that is required to combat malaria in operational settings—a combined effort of line commanders and their medical departments. Both components are essential because malaria prevention in the field is a multicomponent and ongoing program (referred to as malaria discipline) which requires constant monitoring and maintenance. Although the Medical Department provides recommendations for prevention, the line must provide the means of enforcement. Without it, preventive medicine programs are doomed to failure and high disease rates can be expected, compromising operational readiness. As Slim himself stated, "more than half the battle against disease is fought, not by doctors, but by regimental officers."(1) To do this, however, line commanders must be well informed by the Medical Department of the risk of disease and the means of prevention. Other Medical Department responsibilities include monitoring and education. In this and a subsequent article we will review the basics of malaria prevention in the context of recent naval malaria experiences and provide guidelines to help medical officers prepare for deployment to malarious areas.

* Naval forces refers to both Navy and Marine Corps personnel. Marines are the group at highest risk of malaria because of the nature of their mission.

Distribution of Malaria and Chloroquine-Resistant *Plasmodium falciparum*, 1993



Widespread Threat

The causative organism of malaria is a protozoan of the genus *Plasmodium.* Four species infect man, *P. falciparum, P. vivax, P. ovale,* and *P. malariae. P. falciparum* is the most important of the species since it causes much more severe disease than the others, frequently fatal if untreated. Also, drug resistance is common with falciparum malaria.

Malaria is primarily a disease of the warmer areas of the world, being present in most tropical and some subtropical areas (see map). It is common in areas of military operations. Within malaria endemic areas, transmission may vary seasonally and geographically.

Globally, *P. falciparum* and *P. vivax* cause the vast majority of malaria cases; *P. ovale* and *P. malariae* are much less common. *P. falciparum* is found in most areas of the world and is the predominant species in Africa. *P. vivax* is also common in most malarious areas except Africa, Haiti, and the Dominican Republic. It may be more prevalent in some areas of Africa than was previously known, as attested to by the large number of *P. vivax* cases in U.S. forces returning from Somalia. *P. vivax* is the predominant species in India, Pakistan, Bangladesh, and Central America.

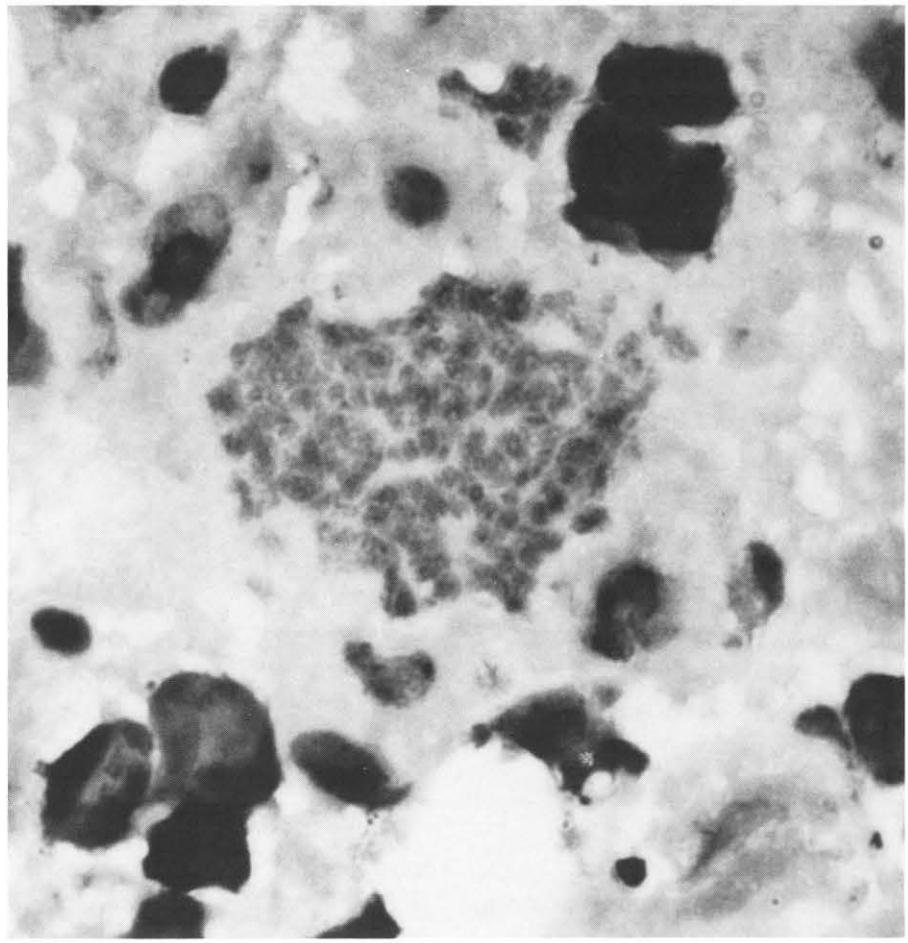
P. ovale is found mainly in Africa, with much lower prevalence in other parts of the world. *P. malariae* is found in most malarious areas of the world, but at a lower prevalence than the other species.

The vector of malaria, the Anopheles mosquito, feeds at night. The greatest risk of infection is therefore from dusk to dawn. In most parts of the world the greatest risk is in rural areas, with little or no risk in cities. However, urban transmission occurs in some areas, especially Africa. In Somalia, several malaria cases occurred in troops who were only in Mogadishu.

A Complex Disease

Malaria has a complex life cycle, consisting of several developmental forms in both the human host and the mosquito. Within the human, there are two phases of infection—liver and blood. The infection begins when an infected Anopheles mosquito injects sporozoites into a person when taking a blood meal. Sporozoites enter the circulation but within a matter of minutes leave the blood and invade liver cells, where they begin to multiply. Generally, 6-16 days later the infected liver cells rupture and release thousands of merozoites into the circulation. In addition to this normal phase of liver development, *P. vivax* and *P. ovale* also have a dormant form known as a hypnozoite. This form may remain in liver cells for months or years before beginning to develop, ultimately causing delayed onset or relapses of malaria. There are no symptoms during the liver phase of infection.

Dr. John Sacci, Jr., NMRI, Bethesda, MD



Liver stage infection of *P. falciparum* in chimpanzee. Although asymptomatic, this single infected liver cell will release up to 30,000-40,000 malaria organisms into the blood to infect RBCs, causing disease.

After release from liver cells, merozoites invade red blood cells (RBCs) where they again begin to grow and divide. After 48-72 hours the RBC ruptures, releasing from 6 to 30 new merozoites into the circulation. These merozoites invade other RBCs, thus starting the cycle over again. It is only at this point, when RBCs begin to rupture, that persons will experience the symptoms of malaria—fever, chills, headache, and muscle aches. The usual incubation period is about 2 weeks. However, the disease may occur from as short as 8 days after exposure for *P. falciparum* to as long as 2-3 years after exposure for *P. vivax* and *P. ovale.*

Several days after the onset of symptoms, some merozoites differentiate into the forms which are infective for the mosquito, male and female gametocytes. When ingested by an Anopheles mosquito, fertilization takes place in the stomach of the mosquito, ultimately resulting in the formation of sporozoites 8-16 days later. Sporozoites migrate to the salivary glands and are ready to be injected when the mosquito takes a blood meal.

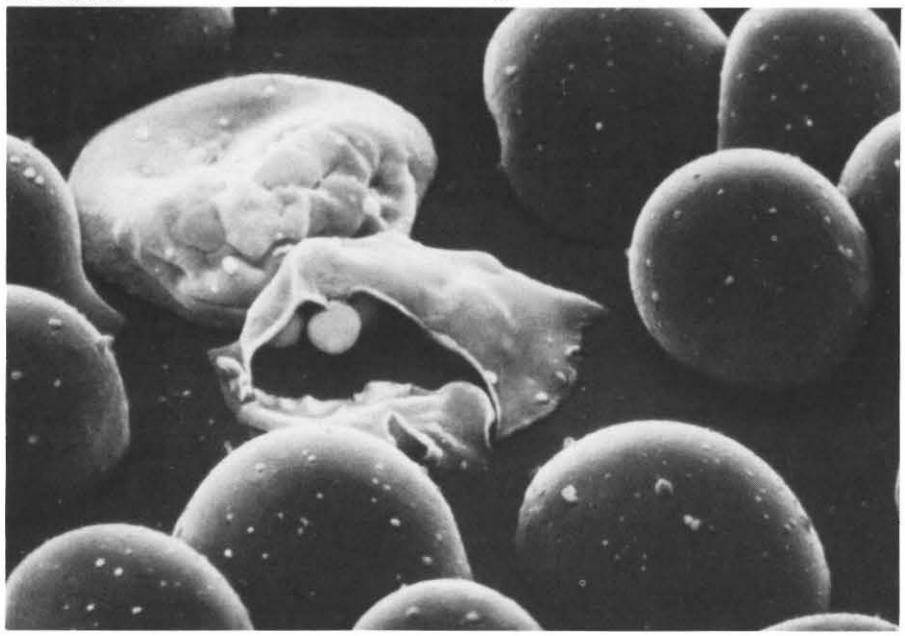
Two points concerning the life cycle are very important in malaria prevention. First, there are no symptoms during the liver phase of infection, which may be as short as several days for *P. falciparum* to as long as 2-3 years for *P. vivax* and *P. ovale.* Consequently, persons may leave malarious areas with the organism in their liver, asymptomatic but destined to become ill at some later time. Second, no single antimalarial drug works against all forms of the organism. For example, drugs that kill the organism in the blood (e.g., chloroquine, mefloquine, and doxycycline) do not eradicate it from the liver. Primaquine is currently the only drug which eradicates hypnozoites in the liver, but it has little effect on blood stages, except for gametocytes. These points underlie the need for continuing prophylaxis after leaving the malarious area, generally with more than one drug.

Malaria in the Navy: 1988 Through Somalia

Although the greatest numbers of malaria cases in military forces generally occur in times of war, sporadic cases and occasional outbreaks occur in peacetime during deployments to endemic areas. Reported malaria cases worldwide in naval forces from February 1988 to May 1993, excluding cases from Somalia, totaled 210 malaria cases in active duty Navy and Marine Corps personnel. As can be seen, most cases occurred in marines and in personnel operating in Pacific-based commands.

Among naval forces, marines are the group at greatest risk for malaria since their mission is usually in rural areas, where transmission is greatest. The Philippines has been the source of most malaria cases in U.S. forces since the end of the Vietnam War, mainly because it was the primary training site for marines in the Pacific. That will obviously change now that Subic Bay Naval Base has closed. Where most cases will occur in the future will likely depend upon where the marines go for training. Thailand is one area where training

Lennart Nilsson



Infected RBC rupturing and releasing merozoites, which will infect other RBCs.

exercises are now being conducted. That is a concern since some of the most resistant malaria in the world exists along Thailand's borders with Cambodia and Burma.

Malaria in Somalia

Operation Restore Hope, the humanitarian assistance mission to Somalia which began in December 1992, has resulted in almost 300 malaria cases among military personnel. Of the 48 confirmed cases which occurred in-country, 35 were in Marines, 10 in Army and 3 in Air Force personnel. Additionally, about 115 cases have occurred to date in Marines and 127 in Army troops(3) after return to the United States. Eighty-eight percent (42/48) of cases in military personnel in-country were due to *P. falciparum* (five cases were due to *P. vivax* and one was unspeciated). In marines, most cases occurred among troops deployed near Baardera in the highly malaria-endemic southern region of the country. Several factors common to operational settings increased the likelihood of malaria infection. Many troops had to spend nights guarding river crossings and other strategic posts near mosquito breeding sites. Although mosquitoes were abundant at night, it was not possible for many troops to sleep under bed nets, due to the nature of their mission. Insect vector control teams deployed later and were effective, but initially mosquito eradication efforts were limited. Moreover, the extremely hot and dusty environment made the use of repellents (DEET) uncomfortable. Many marines also failed on occasion to take doxycycline, the daily malaria chemoprophylactic.

Compounding these difficulties, marines in Baardera switched from daily doxycycline to weekly mefloquine in order to conform with general theater malaria policy and to improve compliance. Because it takes a few weeks to build a protective blood level of mefloquine, however, stopping the doxycycline at the same time the mefloquine was started left many marines underprotected. This drug change was associated with an increase in malaria cases. This episode highlights the importance of achieving an adequate blood level of mefloquine prior to exposure.

Almost 90 percent of the malaria cases in marines who had returned to the United States were due to *P. vivax*. The few *P. falciparum* cases were seen in troops soon after return to the United States, while the *P. vivax* cases have occurred up to 7 months after departure. Although some drug resistance certainly exists in this area of Africa, investigation revealed that the majority of cases failed to take proper terminal prophylaxis (J.A. Newton, personal communication). As discussed, this means they left Somalia with asymptomatic liver infections, and later developed malaria when the organisms emerged from liver cells.

The malaria cases from Somalia illustrate many of the problems associated with malaria prevention in operational forces. Although it is not possible to prevent all malaria cases associated with operations in endemic areas, it is possible, through good malaria discipline, to markedly decrease the impact of the disease.

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3. Department of Preventive Medicine, Walter Reed Army Institute of Research, Washington DC, 24 Feb 1994. ❑

(Part 2, Malaria Discipline, will appear in May-June.)

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Navy Medicine March - April 1944

Jennifer Mitchum and David Klubes

The Pacific Theater

In the Pacific, American forces continued their dual thrust strategy. After seizing the Gilberts and the Marshalls, ADM Nimitz's Central Pacific force was preparing for the invasion of the Marianas. This operation would begin with Saipan in June 1944.

For much of March and April, construction battalions (Seabees) transformed the Marshalls into a forward base and staging area for the invasion of Saipan. Moreover, hospitals in the South Pacific now far in the rear, were dismantled and packed for shipping to other locations in the Central and Western Pacific. Two such hospitals were Mob-3 in American Samoa and Base Hospital No. 4 Wellington, New Zealand, which both closed in April 1944.(1)

Meanwhile, GEN MacArthur was rapidly moving toward the Philippines. To secure the eastern flank for his northwestward advance, MacArthur needed to reduce and isolate the Japanese base at Rabaul on the island of New Britain. In December 1943, the First Marine Division landed at Cape Gloucester on the opposite end of New Britain. Over the next 5 months, the Marines proceeded to eliminate the Japanese forces outside Rabaul's strong fortifications. Meanwhile, continuous aerial bombing of Rabaul's airfields, port, and base infrastructure rendered it offensively impotent.(2)

To finalize Rabaul's isolation, on 29 Feb, units of the 1st Cavalry Division landed at Los Negros in the Admiralty Islands (located between New Britain and New Guinea). Mistakenly believing the island to be undefended, the Americans instead found 4,000 Japanese troops. Luckily, the Japanese were concentrated on the other side of the island. This gave the cavalrymen and the attached Seabees time to dig in against the inevitable counterattacks.

After a number of small attacks, on the night of 3 March, the enemy launched a massive, last-gasp "Banzai" charge. In bitter fighting, the Americans turned back the attackers and eliminated Japanese resistance on Los Negros.(3) During that battle, CPhM Harry Shields, who was attached to the 40th Construction Battalion, disregarded orders to remain in his foxhole and administered critical first aid to the wounded under intense shellfire. After ensuring the safety of his patients, Shields was mortally wounded. In recognition of his extraordinary heroism, he was awarded the Navy Cross.(4)

In a few weeks the Admiralties were secured and MacArthur turned his attention to New Guinea. He ignored the pessimistic advice of his subordinates and decided to leap audaciously some 580 miles westward to Hollandia on New Guinea's northern shore.(5) The intricate plan called for simultaneous assaults at Aitape, Humboldt Bay, and Tanahmerah Bay, which were separated by 120 miles.(6)

The Navy assumed the Army would be incapable of caring for the wounded until base hospitals were established ashore. Therefore, the Navy Medical Department planned to treat the initial casualties. Capitalizing on knowledge acquired during earlier invasions, Navy medicine developed a more streamlined plan for casualty care and evacuation. A medical battalion was to land at each beach to provide initial care and act as a collecting station. Additionally, a medical officer was attached to each beach party to coordinate both the evacuation of wounded to the appropriate ships and the landing of medical supplies.(7)

The plan called for LSTs as the primary evacuation units. Consequently, medically augmented LSTs, which had one medical officer and three corpsmen, were distributed throughout the assault and succeeding echelons. Moreover, in each LST group, one LST was further augmented with an emergency surgical team of 2 surgeons and 10 corpsmen

to provide more definitive treatment.(8) In the event of heavy casualties, troop transports, such as APAs (Attack Transports), APDs (High Speed Transports), and LCIs (Landing Craft Infantry) would also be used to evacuate wounded. LST-464, with its on board medical facility, (see *Navy Medicine* January-February 1994) was originally stationed offshore as an evacuation way-station and hospital ship. Eventually, it moved into Humboldt Bay to become a station hospital for the construction units.(9)

A new feature was surgical specialty teams. Each team had a medical officer who specialized in orthopedics, urology, anesthesia, EENT, and thoracic surgery, respectively, and two corpsmen. They were to care for difficult cases in their field as well as acting as consultants.(10)

On 22 April, American forces landed at Aitape, Humboldt Bay, and Tanahmerah Bay. MacArthur was right; they were not well defended.(11) The Japanese were taken by surprise and the Americans quickly took their objectives with only light casualties.(12) In fact, the Japanese needed 3 months to mass sufficient forces for a counterattack. Although the Navy's medical units were mostly unused, valuable experience was gained for future operations.

POWs

In the Philippines, sick and hungry Allied POWs languishing in Bilibid, Cabanatuan, and other camps continued to face increasing starvation as food became even more scarce. Boiled camote tops salvaged from pitiful gardens, and rice sweepings polluted by sand and pebbles were the norm. At the infamous Bilibid Prison, food was becoming so scarce that tension had reached a new high between guards and inmates. As the Allied noose began to tighten around the Philippines, even the Japanese guards began to feel the pinch. To feed themselves, they stole food from the prisoners. More and more frequently, POWs fought among themselves for the leftovers.

USS *Samaritan* (AH-10) was one of the newly converted hospital ships that were sorely needed in the Pacific.

BUMED Archives

And there were new dangers. By the beginning of 1944, the Japanese began planning for the transfer of POWs to Japan. One of the reasons for these transfers may have been the increasing labor shortage in Japan as more men were conscripted into the Imperial Japanese Army. By March, with American surface forces and troops less than 1,800 miles away in New Guinea and the Admiralty Islands, the Philippines seemed the next target. The Japanese therefore feared losing control of their POWs and having to surrender them if the Philippines were eventually overrun.

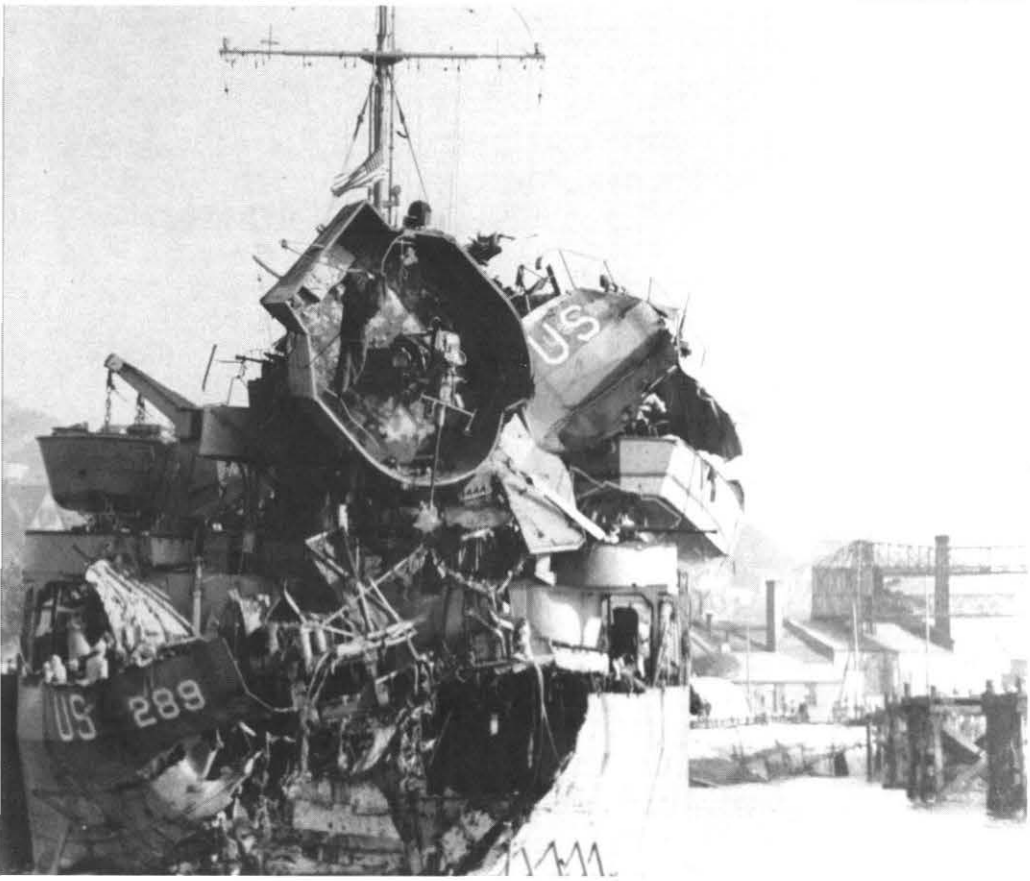
POWs at many of the camps learned through the grapevine that the war was going well for their compatriots but many wondered if they could hold out until the "Yanks and tanks" came back to the Philippines. Some like the commanding officer of the Bilibid Prison hospital, CDR Thomas H. Hayes, even chanced to contemplate what life would be like back home after the war. On 16 March he wrote:

> "Life has gone ahead of us back there and [their] plans there have not taken us seriously into consideration. The trend of life of our people has been set in these years and we are a past issue. I can remember the pathetic instances of the last war, wherein some came back and tried to pick up where they left off. They couldn't. The past is past, and no matter how much it hurts we must realize it, accept it, adjust to it and start out new as a stranger." (13)

Later that month, suffering from progressive blindness brought on by chronic malnutrition, Hayes, in a particularly depressed mood, stated that if the damage was deemed permanent, "I am not going home.... To Hell with it. My mind is made up."(14) As American bombing raids increased toward the end of March, the Japanese began a routine of nightly blackouts in Manila and, of course, Bilibid. Forced indoors at 7:30 p.m. by the new edict, everyone suffered from unbearable heat and clouds of mosquitoes.

In March at the Karenko POW camp on Formosa, a Japanese propaganda crew made a film they told the prisoners would be shown in the United States. CAPT Robert Davis, MC, former commanding officer of

Naval Historical Center



After being torpedoed by a German E-boat during rehearsal for the D-Day landings, LST- 289, returns to England with its stern blown off.

the Canacao Naval Hospital, wrote that the movie's "scenes are especially arranged, and make us appear as if we were living in the land of milk and honey."(15)

Hospital Ships

By this stage in the war, hospital ships had established themselves as an essential ingredient of the medical care system, but more were needed. During early 1944, the Navy commissioned three additional hospital ships. On 24 Feb, the hospital ship *Refuge* (AH-11) was commissioned and served briefly at Norfolk Navy Yard before sailing for Mers-el-Kebir, Algeria. To augment the hospital ships *Solace* (AH-5) and *Relief* (AH-1) in the Pacific, *Samaritan* (AH-10) and *Bountiful* (AH-9) were commissioned on 1 March and 23 March, respectively, and were soon operating in Hawaiian waters.

Navy Medicine at Home

By early 1944, planners predicted that existing medical facilities, in addition to those under construction, would be sufficient to meet expected war casualty needs. Thus, the Navy Medical Department began to consider postwar needs, especially long-term treatment of war casualties.(16) In addition, the Navy Medical Department designated some existing continental hospitals to care for specific medical problems. For example, USNH Mare Island, CA, and USNH Philadelphia, PA, were also designated to care for and instruct amputees in the use of artificial limbs. Similarly, USNH Corona, CA, became a rheumatic fever and tuberculosis treatment center.(17)

There were several administrative changes in the Navy Medical Department as well. BUMED established the Office of Rehabilitation in April to coordinate rehabilitation activities and programs in continental Navy hospitals. The Navy Medical Department's comprehensive rehabilitation program included occupational and physical therapy, physical training, educational services, and civil readjustment. Together these initiatives helped expedite rehabilitation and enabled those unfit for further service to return to civilian life with relative ease.

By 1944, there were about 17,000 members of the Navy Medical and Dental Corps as well as thousands of corpsmen and technicians on active duty. As testament to their diligence and dedication, 55 percent of all sailors and marines wounded since 7 Dec 1941 had returned to active duty by 31 March 1944. Moreover, many of the 40 percent still receiving treatment were expected to return to duty. Less than two percent of those wounded had to be removed from service. Only three out of every hundred reportedly succumbed to their wounds.(18)

D-Day Preparations

By spring, American forces of "friendly occupation" in Britain had swelled to nearly a million and a half troops, many in the coastal regions of Devon and Cornwall, but others scattered throughout the British Isles. Augmented by forces from Britain, Canada, other Commonwealth nations, and token forces of Free French, Free Poles, and troops from other occupied nations, the Allies prepared for the greatest amphibious landing in history. The flotilla that would take them and their equipment to the Continent numbered over 1,300 warships, 1,600 merchant vessels, and 4,000 landing ships.(19)

As in North Africa and Italy, the Navy Medical Department's primary role was to provide medical service to all personnel between the British ports of embarkation and the assault beaches. Once the landings were in progress, medical personnel were to evacuate casualties from the beaches and provide hospitalization afloat within the combat zone. Navy medical personnel were also responsible for medical care in the beach areas while operating jointly with the ground forces.(20)

The final medical plan consisted of three phases: the far-shore phase on the Normandy coast was to deal with the prompt exchange of medical supplies and equipment and evacuation of casualties from shore to ship. Afloat, casualties were to receive emergency medical care to the extent possible. The near-shore phase would deliver casualties to the Army at Channel ports in the United Kingdom.(21)

Planners expected that LSTs would provide the main casualty lift for shore to shore evacuation. However, because of anticipated underwater obstacles and mines, they would be unable to land directly on the invasion beaches at the outset to receive casualties. Therefore, other methods were tested for receiving casualties over the sides of ships unable to land. There was also to be a secondary evacuation role for LCIs, troop transports, and hospital ships.

In February and March, medical personnel designated for LST duty began arriving in the United Kingdom. In April practical demonstrations in casualty handling were held at the port of Fowey in Cornwall. The final plan included 90 LSTs with 3 medical officers and 20 corpsmen each, 13 LSTs with 2 medical officers and 20 corpsmen, and 3 LSTs with 1 medical officer and 20 corpsmen. Each LST was equipped with medical supplies and equipment to provide surgical and nursing care for 200 patients on the return to the United Kingdom.(22)

By the last week in April, training exercises for the D-Day landings had reached a crescendo. In the early morning hours of 28 April, these rehearsals took a tragic turn when nine German torpedo craft (E-boats) surprised a night exercise off the Devon coast sinking two LSTs and damaging a third. Well over 700 American and British soldiers and sailors were killed outright or succumbed to the frigid water. Navy medical personnel were among the casualties. This so-called Slapton Sands incident remained classified until the early 1980s.

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Approach to Bleeding Disorders

CDR James N. Frame, MC, USN

In the military setting, the diversity of operational assignments, proximity to tertiary medical treatment facilities (MTFs), availability of ancillary and supportive staff and resources, and evacuation policies and resources within and outside the theater of operation represent variables that may influence opportunities for the diagnosis and management of the patient with a bleeding disorder. The discussion that follows provides a clinical template from which to recognize the presence of a bleeding disorder, select and interpret initial diagnostic tests, and initiate supportive care based upon these findings.

History

A screening history evaluating hemostasis should address the following questions:

Has the patient experienced abnormal bleeding or bruising and when?

Recent onset of bleeding may suggest an acquired defect such as immune thrombocytopenia (ITP). Bleeding dating back to childhood may suggest a hereditary disorder (hemophilia or von Willebrand's disease [vWD]).

Is there a history of an acquired disorder that could impair hemostasis?

Examples: systemic lupus erythematosus, chronic liver disease, uremia, hematologic malignancies.

Is the patient taking a drug or toxin that could impair hemostatic function?

Examples: aspirin or aspirin-containing drugs, nonsteroidal anti-inflammatory drugs, antihistamines, heparin, coumarin, and ethanol.

Have other members of the family bled abnormally?

In classical vWD or Osler-Weber-Rendu syndrome, abnormal bleeding may be inherited in an autosomally dominant fashion (no skipped generations, both sexes affected). Sex-linked inheritance (skipped generations through asymptomatic or carrier females) may suggest factor VIII or factor IX deficiency. The remainder of the coagulation factor disorders and certain congenital qualitative platelet disorders are inherited in an autosomally recessive fashion. Constructing a family tree of affected and nonaffected members is helpful in sorting out the mode of inheritance.

Additional inquiry into the bleeding history of children and adults may be valuable.

In children, has there been any bleeding from: (a) the umbilical stump (e.g., factor XIII deficiency), (b) after circumcision, (c) around the mouth in toddlers (vWD or hemophilia), (d) any hematomas of scalp (frequency, size), (e) any bleeding after minor trauma or prolonged nosebleeds requiring medical attention?

In adults, has there been any: (a) abnormal bruising (note size, frequency, relationship to trauma, after intramuscular injections), (b) excessive bleeding from small cuts (examine skin and inquire into scars), (c) bleeding after dental extractions (number of teeth extracted, time of onset: immediate onset lasting >24 hours or delayed after several days suggests a hemostatic defect), (d) bleeding after previous surgery may not be immediately recollected and medical record review necessary; bleeding on the second or third day is suggestive of a hemostatic defect, e.g., vWD, factor XI deficiency? Prolonged bleeding from the surgical site may result from local causes.

Physical Examination

The type of bleeding may provide a clue to the nature of the hemostatic defect. Mucocutaneous bleeding including petechiae, ecchymoses, epistaxis, gastrointestinal, genitourinary bleeding is highly suggestive of a platelet disorder. Bleeding into joint spaces, muscles, skin (palpable hematomas), between fascial planes, or into the retroperitoneum is suggestive of a *coagulation disorder* (i.e., hemophilia, coumarin toxicity). Unexplained hypotension or anemia in an anticoagulated patient may suggest retroperitoneal or adrenal hemorrhage. Stigmata of liver disease, abnormal elasticity of the skin and hyperextensibility of joints (connective tissue disorder), and telangiectasias (Osler-Weber-Rendu syndrome) should be noted. The latter may not be apparent in a severely anemic patient.

Laboratory Investigation

Blood obtained for initial screening of a suspected hemostatic disorder should be obtained under the direct supervision of the physician or technician performing the test. Avoid taking blood through heparin-contaminated intravenous or intra-arterial lines. Initial laboratory screening tests include the CBC with platelet count, review of peripheral blood smear, prothrombin time (PT), activated partial thromboplastin (aPTT), thrombin time, and fibrinogen.

The peripheral blood smear (PBS) should be reviewed in *all* patients with a suspected bleeding disorder evaluating the size, distribution, and number of platelets. Individual platelets or small clumps should be seen in each oil-immersion field (100x) with approximately one platelet per 10-20 red blood cells. Pseudothrombocytopenia caused by platelet agglutination or satellitism must be excluded by review of the PBS. Collecting blood in a 37°C water bath and tested at 37°C is necessary if a cold agglutinin is suspected. If schistocytes (fragmented RBCs) and thrombocytopenia are present, thrombotic thrombocytopenic purpura (TTP) or disseminated intravascular coagulation (DIC) should be suspected.

Large platelets (increased mean platelet volume, MPV) and thrombocytopenia, suggests platelet destruction (e.g., ITP). The occurrence of giant platelets or platelet masses without thrombocytopenia may indicate a myeloproliferative disorder. Thick or thin Giemsa-stained blood smears evaluating for malaria or babesiosis should be obtained in the appropriate clinical or operational setting.

If the PT and/or aPTT is/are prolonged, repeating the study(s) with a 1:1 mixture of normal and patient plasma is necessary. If the 1:1 mixture corrects or normalizes, a coagulation factor *deficiency* is suggested. If the 1:1 mixture fails to correct, a coagulation factor *inhibitor* is suggested. Among patients with acquired factor VIII inhibitors, the aPTT may correct upon the immediate 1:1 mixing study, but subsequently prolong upon retesting after 30 minutes and 60 minutes of incubation at 37°C. Thus both incubated and unincubated mixing studies need to be performed. Spurious values for the PT and aPTT may be obtained if the *blue-top tube* is not completed filled.

If there is a convincing history of bleeding after trauma or surgery and the initial screening tests are normal, factor VIII, factor IX, vWD antigen, and Ristocetin cofactor assay, should be obtained to exclude mild hemophilia (usually f.IX) and vWD. Platelet aggregation studies may be of benefit in a patient with normal platelet counts and in the absence of antiplatelet agents to evaluate for qualitative platelet defects. The thrombin time may be prolonged in hypo- or dysfibrinogenemia, by increased fibrin degradation products, or by heparin. If the platelet count, BT, PT, aPTT, and fibrinogen are normal, and vWD and mild cases of hemophilia have been excluded, hereditary factor XIII deficiency should

TABLE 1

SCREENING TEST PATTERNS FOR HEMOSTATIC DISORDERS

Disorder	Platelets	BT	PT	aPTT	TT
HEREDITARY					
VWD	N	L	N	N,L	N
F. XII deficiency[1]	N	N	N	L	N
F.VIII, F.IX, or	N	N	N	L	N
F.V,X,II deficiency	N	N	L	L	N
F.VII deficiency	N	N	L	N	N
F. XIII deficiency	N	N	N	N	N
ACQUIRED					
Thrombocytopenia	D	L	N	N	N
ITP	D	N,L	N	N	N
TTP	D	L	N	N	N
DIC	D	L	L	L	L
Qualitative Platelet Disorder	N	L	N	N	N
Vit. K deficiency or Coumarin effect	N	N	L	N,L	N
Chronic liver disease	N	N	L	N,L	N,L
Factor VIII inhibitor	N	N	N	L	N
Heparinemia	N	N	N,L	L	L
Lupus anticoagulant[1]	N	N	N,L	L,N	N

N(normal), L(long), D(decreased), BT(bleeding time), PT(prothrombin time) aPTT(activated partial thromboplastin time), TT(thrombin time).
[1]Usually associated with increased risk of thrombosis.

be considered. Fibrin clot stability testing in normal saline (clot stability) and 5M urea (clot dissolution) should be obtained.

The bleeding time test (BT) is of limited utility as a diagnostic test but may be of use in evaluating patients with suspected qualitative platelet defects or vWD. *If a patient is thrombocytopenic, the BT is unnecessary and should not be performed.*

A summary of screening test patterns in hemostatic disorders is appended in Table 1. In the majority of circumstances, the results of these tests (if abnormal) warrant secondary or confirmatory testing. Table 2 outlines disorders with purpura or easy bleeding without the presence of thrombocytopenia or a coagulopathy.

General Management Considerations

Once a diagnosis is made, the risk of bleeding or the consequences of a particular hemorrhagic event determines the treatment in an individual patient. Stabilization within the extent of available resources and expeditious evacuation to the next appropriate echelon of care may be the only reasonable option in select cases. Avoid intramuscular injections and medications or toxins that impair hemostatic function. Discontinue any medications that may have precipitated drug-induced thrombocytopenia. Consider acetaminophen, opioid analgesics, or magnesium cholinesalicylate if pain medications are required. Assess medications taken by the patient that may retard or enhance the effects of anticoagulants. Limit activity that could be associated with a risk of significant trauma. Consider suppressing menses with oral contraceptive agents if there are no contraindicatives in the appropriate thrombocytopenic patient with high risk of or active bleeding. Apply local pressure at venipuncture sites for 5-10 minutes to avoid unnecessary bleeding or hematoma formation. Recognize that DIC may reflect the presence of underlying disorders not limited to but may include infections, massive trauma, heat stroke, extensive burns, obstetrical complications, vascular disorders, metastatic cancer, hematologic malignancies, intravascular hemolysis, or snake bite envenomation syndromes.

Treatment Considerations for Platelet Disorders

In the absence of a qualitative platelet discorder or acute episodes associated with an increased risk or hemorrhage, serious bleeding will not occur in most patients until the platelet count is $<5000/mm_3$. Bleeding may occur at higher platelet counts in patients with fever and infections, patients with severe gastrointestinal mucositis, patients receiving anticoagulants or antiplatelet therapy, patients with hyperleucocytosis, and in patients with central nervous system metastases. Prophylactic platelet transfusions should be reserved for clinically afebrile nonbleeding patients with platelet counts $<10,000/mm_3$ and for patients in whom keeping platelet counts $>20,000/mm_3$ is necessary secondary to an increased hemorrhagic risk. In patients who are about to undergo an invasive procedure with a significant risk of bleeding or where hematoma formation could jeopardize local anatomy achieving platelet counts of $50,000-100,000/mm_3$ may be necessary.

If a diagnosis of ITP is made, prednisone 1-2mg/kg/day should be given as initial treatment. Platelet transfusions are reserved for life-threatening hemorrhage or with severe thrombocytopenia if the diagnosis is uncertain. A diagnosis of TTP should be strongly suspected in a patient with thrombocytopenia, microangiopathic hemolytic anemia (fragmented RBCs), elevated LDH with or without neurologic or renal abnormalities or fever (see Table 1).

Emergent referral to a MTF with plasma exchange and/or dialysis capabilities and adequate blood product and medical staff support is essential. Monitoring the renal and neurologic status is vital. If the cardiovascular status and monitoring capabilities permits, 4-8 units of fresh frozen plasma (FFP) infused over the first 12-24 hours plus prednisone 1-2mg/kg/d should be instituted as a stopgap measure while the patient is being promptly transferred for definitive care. *The unwary administration of platelet transfusions in these patients can be catastrophic leading to stroke, progressive renal failure, and/or death.*

The treatment of qualitative platelet defects is directed at treatment of the underlying disorder (e.g., dialysis in uremic patients). In both congenital and acquired disorders, deamino-D-arginine vasopressin (DDAVP, 0.3mg/kh IV) administered over 20-

TABLE 2

DISORDERS WITH PURPURA OR EASY BLEEDING WITHOUT THROMBOCYTOPENIA OR COAGULOPATHY

1. Amyloidosis*	6. Malignant dysproteinemia
2. Connective Tissue Disorders	7. Mechanical Purpura
3. Cryoglobulinemia	8. Scurvy
4. Hypercortisolism	9. Senile Purpura
5. Kaposi's Sarcoma	10. Vasculitis

* May be associated with F. X > IX deficiency

30 minutes, cryoprecipitate (10-15 bags), or platelet concentrates may provide transient improvement in platelet function.

Treatment Considerations for Coagulopathic States

If a hereditary acquired clotting disorder is suspected, confirmatory testing and therapeutic planning is necessary. Transfusion of FFP is indicated in the treatment of documented factor deficiencies that cannot be treated more efficiently with component preparations. As a unit of FFP (200-350 ml) contains all coagulation factors, factor level with increase by 2-3 percent per unit of FFP infused in a 70-kg adult. Spontaneous hemorrhage is unusual with levels >5 percent and factor replacement is normally not indicated in the absence of bleeding. It is prudent to have an accessible reference text for a more detailed discussion of these disorders and treatment planning.

Vitamin K deficiency may be treated with vitamin K 10-15 mg subcutaneously for several days. In severe hepatocellular disease, the coagulopathy may not respond completely to vitamin K administration. FFP is the treatment of choice and may be limited by the large volumes required (1-1.5 liters).

Treatment aimed at the underlying disease is critical in DIC. Replacement therapy with FFP, platelet concentrates, and/or cryoprecipitate is indicated if the patient is bleeding or requires an operative intervention. The risks of or the presence of bleeding in the setting of abnormal tests is a much better guide to initiating replacement therapy with blood products.

Mild coumarin toxicity with a PT several seconds beyond the therapeutic range is treated by withholding coumarin for a few days and resuming treatment with lower doses once the PT is within therapeutic range. If the PT is prolonged without life threatening bleeding, the administration of subcutaneous or intravenous vitamin K (5-10 mg) can be used. In the setting of life-threatening hemorrhage and a prolonged PT secondary to coumarin toxicity, prothrombin complex concentrates (Konyne) or the rapid infusion of FFP (10-20cc/kg) may be used. Treatment with prothrombin complex concentrates may cause thromboembolic episodes and DIC, especially in a patient with underlying liver disease.

Gastrointestinal hemorrhage encountered during therapeutic anticoagulation should prompt an evaluation for an underlying gastrointestinal tract malignancy and a reassessment of the current level of anticoagulation. Among patients receiving therapeutic or prophylactic doses of heparin, platelet counts should be monitored as heparin-associated thrombocytopenia may develop. Heparin-associated thrombocytopenia promptly corrects with drug withdrawal in most cases.

Treatment Considerations in Special Settings

Massive Transfusions. There is currently no evidence to support the routine prophylactic administration of FFP or platelet concentrates *for a fix volume* of transfused whole blood or packed red blood cells. Spontaneous bleeding seldom occurs with a platelet count greater than 20,000/mm3. Supplemental FFP or cryoprecipitate as a source of fibrinogen should be considered when the fibrinogen is less than 80mg/dl. One recent approach to the treatment or coagulopathy or thrombocytopenia following massive blood transfusion suggest that FFP and platelet transfusions *may be helpful* when the PT or aPTT is substantially prolonged (>1.5 times control) and/or the platelet count is less than 100,000/mm3, respectively. These parameters represent *relative thresholds* that require dynamic reassessment.

Snake-Bite Envenomation. Following envenomation from crotalid-species (pit-vipers) bites, life-threatening thrombocytopenia, hypofibrinogenemia, and consumption of other coagulation factors may develop over the ensuring 6-24 hours. While the rapid administration of FFP, cryoprecipitate, and/or platelets may help terminate clinical bleeding, the time administration of species-directed antivenin represents the cornerstone of management.

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Naval Health Sciences Education and Training Command (HSETC) Highlights

• ITRO

By now, most all of us are aware of something called ITRO, the Interservice Training Review Organization. Begun in 1972 as a voluntary program, ITRO continues today with three clear goals:

(1) To review all training and related activities to increase effectiveness and efficiency of course or curriculum consolidations, standardization, and administration.

(2) To perform special training studies.

(3) To provide a forum for ideas, information, and new technology.

In 1992, as a result of a major Military Training Structure Review (MTSR), Chairman, Joint Chiefs of Staff, GEN Collin Powell mandated that ITRO review all officer and enlisted training by 1996 to determine which programs could be consolidated or co-located.

ITRO's executive board is comprised of each service's training chiefs, who meet quarterly and report to the Vice Chairman, Joint Chiefs of Staff. The medical portion of ITRO is managed by the Health Care Committee (HCC)—the three Surgeons General representatives, the three training command chiefs, and three top-ranking enlisted advisors. The HCC executive board is permanently chaired by the Navy, currently RADM Mariann Stratton, director, Navy Nurse Corps and assistant chief BUMED for personnel management. CAPT James F. Bates, commanding officer, HSETC, serves as deputy chair.

As a result of the 1992 mandate, the HCC has focused its efforts on reviewing entire "families" of training programs and specialty areas (from laboratory sciences to leadership and management programs), with a special emphasis on reducing infrastructure and administrative costs. Toward this end, the HCC has:

—established a mission, vision, and guiding principles.

—commissioned 20 analysis groups to study training consolidation.

—created a four-person, tri-service HCC Support Office at HSETC.

—adopted options for conducting the training reviews.

This last item, a key element in the ITRO process, needs further explanation. In the past, tri-service groups convened to consider medical training consolidation, plan a joint curriculum with service-unique tracks, and look for a location with enough classroom and lab space and base support. The decision to consolidate was based on cost-effectiveness and the recommendations of medical program advisors, course directors, and instructors. Since the question is no longer *whether* to consolidate but *how,* the HCC is considering four consolidation options:

(1) Sequencing. This is a "domino" method. As geographically separate training programs combine at a single location, space is freed up for other consolidations.

(2) Civilian involvement. This refers to the possibility of civilian contracting for certain programs.

(3) Single site. All training would be at one location, e.g., at a BRAC site.

(4) Consolidated Training Centers (CTC). A CTC is a deliberate location of "family groups" in which there would be three or four major training centers of excellence.

The three Surgeons General have expressed considerable interest in the CTC and sequencing options; the HCC Support Office has determined a plan for addressing each option.

At any rate, a tremendous amount of work remains for all three services and the HCC Support Office. For further information on ITRO, call Dr. Mort Lockett, Commercial 301-295-5756.

• Continuing Medical Education (CME)

Management responsibility of CME has been realigned at HSETC. It is now under the auspices of CAPT B.T. Hogan, MC, director for Medical Corps professional programs. This move places Medical Corps training programs under a single manager. Specific points of contact for CME are: LT(JG) A.P. Arvanitis, MSC, HM2 E. Pinder, and HM2 D. Thompson. They may be reached at DSN 295-0649 or Commercial 301-295-0649.

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